was presented the ascents have taken place. Six balloons were liberated, and five of these have been recovered.

It is desirable that observations of pilot balloons should be obtained in Ireland in addition to the records from registering balloons, and the committee recommend re-appointment, with a grant of 50*l.*, to permit of this extension of the work. A special theodolite, costing about 30*l.*, is necessary for the observations. The additional outlay on balloons and hydrogen for the pilot-balloon observations would be comparatively small.

In the table temperature is expressed in degrees centigrade above the absolute zero $-273°$ on the ordinary scale. H_c is the height and T the temperature at which temperature begins to be practically constant in a vertical direction.

A SCIENTIFIC MISCELLANY.

THE Smithsonian report for the year 1910 has just been published by the institution. Besides the report of the regents and the secretary, the volume contains, as usual, a "general appendix," consisting this year of thirty-four papers of popular interest on various branches of science, also biographies of a number of prominent scientific men who have recently died. Some of the papers are original, while others are reprinted from foreign and domestic scientific and technical periodicals. All the articles are selected with the view of furnishing the latest accurate information on topics which are believed to be of interest to a wide circle.

Aviation.

A review of modern progress in aviation is ably recorded by the late Mr. Octave Chanute. His paper covers the principal advances made in aviation, beginning with the experiments of Hiram Maxim in 1894, and including Langley's experiments (1896–1903), the author's own investigations, the work of the Wrights, Dumont, de Lagrange, Farman, Blériot, Bell, Curtiss, and others, bringing the subject down to the close of the year 1909.

Reclamation of Arid Lands.

Mr. F. H. Newell, director of the Reclamation Service, sets forth the recent progress in the reclamation of the arid lands in the Western States. The work of reclamation includes all the Western States and territories, where nearly 10,000 families are being supplied with water. Through this great undertaking the waste waters of the West are being conserved, destructive floods prevented, apparently valueless lands converted into productive farms, and thousands of families settled in newly opened territory, where they are maintaining homes on reclaimed land. Besides engineering, with its business and financial problems, the article deals with many other subjects, such as the character of settlers, the size of farms, crops, &c., and the individual projects which together furnish water for about 1,000,000 acres, nearly one-half of which is already settled.

Electric Power from the Mississippi.

A kindred topic is the great electric power plant at Keokuk, Iowa, with its 4278-foot concrete dam across the Mississippi River between Keokuk, Iowa, and Hamilton, Ill. This subject is treated by Mr. Chester M. Clark in a well-illustrated article entitled "Electric Power from the Mississippi River." The paper shows the development of the largest single hydro-electric plant in existence through the construction of what is undoubtedly the greatest bank-to-bank dam in the world.

Papers on Physics, Chemistry, and Astrophysics.

Under the heading of physics there is an account, by Mr. T. Thorne Baker, of experiments and researches in the telegraphy of photographs, transmitted by both the wire and the wireless systems; Prof. Jean Becquerel, professor at the Museum of Natural History of Paris, has permitted the translation of his valuable paper on modern ideas on the constitution of matter, comparing the old theories of matter with the newer views recently confirmed by experiments; and Mr. R. A. Millikan has abridged his treatise on "The Isolation of an Ion," which deals with the exact measurement of an elemental electrical charge and several analogous problems.

Dr. Charles E. Munroe, professor of chemistry at George Washington University, and a well-known authority on explosives, has written an interesting paper on the modern developments in methods of testing explosives.

Mr. C. G. Abbot, director of the Astrophysical Observatory of the Smithsonian Institution, contributes an article on the recently developed subject of astrophysics, which is a study of celestial physics, but pertains principally to the heat and other physical properties of the sun. The paper relates to the solar constant of radiation, a topic on which Mr. Abbot is well informed, having pursued studies in that direction for nearly sixteen years at the Smithsonian Observatory in Washington, and on Mount Whitney and Mount Wilson, California. In this article the author deals with the problem of measuring the amount of solar heat received by the earth and that lost in transit to it. The subject of astrophysics is further treated by Messrs. Curtiss, Deslandres, and Bosler in three articles.

What Constitutes the Earth?

Under the title "What is Terra Firma?" Mr. Bailey Willis, of the U.S. Geological Survey, attacks the old, yet modern, problem of the construction and balance of our globe in a review of current research in isostasy. In the discussion of this puzzling question Mr. Willis advances the theory that the foundation of all the continents is composed of solid rock which is self-crushed to a depth of about 120 kilometres, but rendered sufficiently rigid by pressure to maintain its form during prolonged geological periods with but slight change.

The Future Habitability of the Earth.

In line with the construction and condition of the globe, another author, Prof. T. C. Chamberlin, brings up the further vital question "The Future Habitability of the Earth" in an article in which he reviews the past, and considers the future, of the world as a dwelling-place for the human race. Many branches of science enter into the discussion; but upon geology, physics, chemistry, astronomy, and astrophysics rests the burden of the arguments. Prof. Chamberlin thinks that the earth will remain habitable for tens of millions of years, but concedes that the close approach of a celestial body to the sun would probably result in the disruption of the solar system and bring disaster to the earth. He further states, in regard to the future possibilities of scientific research, that "when moral purpose and research come to be the pre-eminent characteristics of our race by voluntary adoption and by the selective action of the survival of the fittest, and when these most potent attributes join in an unflagging endeavour to compass the highest development and the greatest perpetuity of the race, the true era of humanity will really have been begun."

Botany and Forestry.

Several papers come under the head of botany, among them an interesting sketch of the sacred ear-flower of the Aztecs, a plant the identity of which has been a mystery for years, and only recently rediscovered by the author, Mr. W. E. Safford, of the Bureau of Plant Industry. This little flower, resembling the human ear, has a remarkable history, and dates back to the early explorations of Mexico. It was first described in 1569 by Padre Bernardino de Sahagun, who states that it was much used owing to its delicious fragrance and its flavour when used as a spice. Despite the formidable name (Xochinacaztli) which it bears, the author suggests its cultivation on account of its unusual fragrance and pleasant spicy flavour.

Mr. Henry S. Graves, chief of the Forest Service, contributes a well-illustrated and original article on forest preservation, in which he carefully considers all points in the great problem, making many things clear which have long been obscure.

Medicine and Medical Researches.

Those interested in medical research and allied subjects will find matter of concern in the following papers:—manifested life of tissues outside of the organism, by Mr. Alexis Carrel and Mr. Montrose T. Burrows; epidemiology of tuberculosis, by Prof. Robert Koch; the significance of the pulse-rate in vertebrate animals, by Dr. Florence Buchanan; and sanitation on farms, by Dr. Allen W. Freeman.

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Ethnology and Anthropology.

A comprehensive paper on the contemporary Slav peoples from a geographical and statistical point of view, by Mr. Ludor Niederle, of the Bohemian University of Prague, which has been translated from the Slavic language into English, funished new information on the history and distribution of these peoples.

Dr. J. Walter Fewkes, of the Bureau of American Ethnology, contributes a brief review of his recent work and investigations in cave dwellings, both at home and abroad. This paper is entitled "The Cave Dwellings of the Old and New Worlds."

The report also contains biographies of Melville W. Fuller, Sir W. Huggins, and Alexander Agassiz, together with papers on other subjects.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

IT is announced that the sum of 300,000*l.* has been raised for the endowment fund for McGill University. The Duke of Connaught, in a telegram of congratulation to Mr. Angus, chairman of the McGill Campaign Committee, directs attention to the fact that this large sum was collected in five days.

IN connection with the vacancy in the chair of mathematics at the University of Edinburgh, occasioned by the death of Prof. Chrystal, the curators of patronage of the University, in whom the patronage of this chair is vested, have decided to receive applications from intending candidates, along with testimonials, which should be lodged with their secretary, Mr. A. B. Fleming, 4 Albyn Place, Edinburgh, not later than Thursday, February 8, 1912.

WE learn from *Science* that as a result of the action of the Michigan Board of Tax Equalisation, it is estimated that the University of Michigan will in the future receive 41,600*l.* more from the State for its maintenance than hitherto. From the same source we find that at the last session of the Legislature of the State of Minnesota, among other appropriations for the University was one which will produce 1000*l.* for each of the two years before the next Legislature assembles to be voted exclusively to research, not agricultural, since that is cared for otherwise. Our contemporary also states that by the will of Miss Phoebe Caroline Swords, of New York City, 4000*l.* is bequeathed to Columbia University.

A DINNER was given at the Savoy Hotel on November 23 in aid of the fund for the erection and endowment of new buildings for Bedford College for Women. The sum of 100,000*l.* is required to complete the new buildings and provide the required endowment; and of this amount 50,000*l.*, including a grant of 20,000*l.* from the London County Council, had been secured before the dinner. The London County Council has promised a further 10,000*l.* if a like sum should be obtained without delay. The primary object of the dinner was to raise the amount necessary to secure the second donation from the London County Council; and it is satisfactory to record that at the conclusion of the dinner more than 7000*l.* had been subscribed. But 30,000*l.* will still be required, even after the second contribution from the London County Council has been received.

THE most recent addition to its educational series published by the Manchester University Press is entitled "Outlines of Education Courses in Manchester University." The syllabuses of which the volume, running to 189 pages, is composed have been prepared to assist the lecture and demonstration courses given in the department of education of the university; and they are intended for the use of students. The first syllabus covers Prof. M. E. Sadler's course on the history of education in England from 1800 to 1911, and consists of exhaustive notes on each lecture, together with an invaluable bibliography directing the student to works of reference where the subjects touched upon can be studied in greater detail. Students of education everywhere will welcome this complete guide to the study of the history of education. Prof. Findlay's notes on his lectures on the principles of education are somewhat briefer, and will give the students much more to do for themselves. Here, too, frequent references to standard works on pedagogy will prove of the greatest service. The remaining discourses are more miscellaneous in character, and are dealt with in a less extended manner. The publication of the syllabuses, and the invitation extended in an introductory note to educational workers generally to criticise and advise, may be taken as a welcome indication that earnest efforts are being made in our universities gradually to build up a science of education founded upon experience and experiment.

THE annual report on the 115th session of the Glasgow and West of Scotland Technical College has now been circulated. We notice that for the academic year 1910–11 there was an increase in the numbers of both day and evening students. The success with which the governors have established cordial relations with local employers of labour is very marked. For a number of years past the requests from employers for the nomination of qualified students in chemistry to fill industrial posts have been greater than the college could satisfy, and a similar position is arising in the engineering sections of the college. Most of the appointments thus gained are in works in the district, but a considerable number are abroad. Manufacturing firms in the district are recognising in increasing measure, also, the ability of the college to assist them in many of the problems arising in their industrial operations. Requests have been made to the college for reports and advice on a variety of subjects, in addition to simple questions on the strength of metals and of building materials, the accuracy of measuring instruments, and so on. Another satisfactory feature of the strengthening relations between the college and employers is the increasing number of firms which now request reports upon the attendance and progress of their apprentices at college classes. The report shows that new courses of a technical kind are arranged as soon as a new demand arises, continual additions are made to the already extensive equipment, and the building scheme is now completed. The financial position of the college appears to be in an equally satisfactory state.

WE have received a copy of the report for the session 1910–11 of the work of the department of technology of the City and Guilds of London Institute. During the session 4495 classes in technological subjects were registered in 316 towns. These classes were attended by 52,680 students. So far as the examinations conducted by the institute during the year were concerned, the report shows 24,342 candidates were presented in technology from 465 centres in the United Kingdom, and of these 14,206 passed. By including the candidates from India and the Dominions overseas, and those for the teachers' certificates in manual training and domestic subjects, the total number of examinees was 27,205. This figure shows an increase on those of any previous year. During the session, too, ninety-one centres were visited by members of the institute's staff for the examination, inspection, or organisation of classes, several centres receiving two or three visits in order to complete the inspection. The report again directs attention to the criticisms and suggestions received from the examiners of the institute. We can here quote only two examples:—"Teachers would, for instance, be well advised to keep their knowledge thoroughly up to date by studying the transactions of the leading technical societies and institutions, and the articles in technical journals, and not confining themselves to text-books. In many subjects teachers should also, if possible, give more practice to students in expressing their ideas, in arithmetical work, and in careful sketching, *e.g.* by requiring the presentation of well-illustrated notes of lessons." The want of suitable and adequate preliminary education exhibited by students presenting themselves for entry into technical classes is again commented upon.

THE International Council of Women has done a piece of very useful work in issuing a pamphlet on "National Systems of Education" (Aberdeen: Rosemount Press, price 3*d.*). In response to a form of inquiry drawn up by Mrs. Ogilvie Gordon, representatives of the women's organisation in most European countries, in the great self-governing communities of the British Empire, and in the United States have given us brief *résumés* of the actual

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